

REMARKS

Claims 1, 3, 7, 8 and 14-19 are pending in this application. Claims 7 and 8 are currently withdrawn from consideration.

I. Interviews

Applicants express their appreciation for Examiner Parvini and Examiner Lorengo conducting the interviews with the undersigned on August 13, August 23 and October 4, 2010. Applicants' summary of the substance of the interviews is included in the following remarks.

II. Rejection Under 35 U.S.C. §103(a)

Claims 1, 3 and 14-17 were rejected under 35 U.S.C. §103(a) as allegedly being unpatentable over U.S. Patent Application Publication No. 2004/0040217 (Takashina) in view of U.S. Patent No. 6,337,060 (Hiraki) and in view of U.S. Patent No. 5,690,539 (Swidler), and still further in view of Pyridine Safety Data. This rejection is respectfully traversed.

Claim 1 is directed to a dielectric film forming liquid composition comprising (1) diamond fine particles purified and oxidized by heating with a purifying agent, (2) a dispersant, and (3) an amine substance having a boiling point of 50°C or higher and 300°C or lower. Applicants respectfully submit that one of ordinary skill in the art would not have been led to the dielectric film forming liquid composition of claim 1 from the teachings of Takashina, Hiraki, Swidler and Pyridine Safety Data.

Takashina describes a polishing composition comprising an aqueous medium and abrasive particles, wherein the abrasive particles have a specified size distribution. See the Abstract. Takashina describes that the polishing composition is useful in the planarization of a semiconductor substrate. See paragraphs [0002] and [0024].

At paragraphs [0035] to [0037], Takashina describes several materials that may be used as the abrasive particles in the polishing composition. Among the long list of materials is mentioned diamond. At paragraphs [0048] to [0055], Takashina describes that the polishing composition is an aqueous composition that may optionally include a long list of various additives, including a pH adjusting agent, a dispersion stabilizer, an oxidizing agent, a chelating agent, a preservative and the like. As the pH adjusting agent, Takashina describes, among other agents, water-soluble organic amines. See paragraph [0051].

Takashina fails to describe or suggest a dielectric film forming liquid composition. The composition described in Takashina is a polishing composition for use in the planarization of a semiconductor substrate, and is not a film forming liquid composition, much less a dielectric film forming liquid composition.

During the interviews, the Patent Office has alleged that the dielectric film forming property of the liquid composition was merely a preamble limitation that would not be given patentable weight without supporting evidence. The Patent Office suggested that a Rule 132 Declaration be submitted to establish that the polishing composition of Takashina was not capable of forming a dielectric film. Applicants have taken the suggestion of the Patent Office, and submit herewith the requested Rule 132 Declaration.

In the Rule 132 Declaration, Experiment 1 was first conducted in order to show that the composition of claim 1 formed a dielectric film with a dielectric constant of 2.5. The film was uniform with no pinholes or cracks, and was well adhered to a silicone substrate, confirming the suitability and use of the composition in forming a dielectric film.

Experiments 2 and 3 were conducted in accordance with the teachings of Takashina. In Experiment 2, crude diamond powder (i.e., diamond powder not purified and oxidized as required in claim 1) was used to form a polishing composition following the teachings of Takashina, and using monoethanol amine instead of potassium hydroxide so as to be in line

with the composition of claim 1. In Experiment 2, a composition capable of forming a film was not achieved at all. In Experiment 3, the composition of Experiment 2 was used with additional water added. In Experiment 3, it was possible to form a thin film, but the thin film showed numerous cracks and was easily peeled off of a silicone substrate when rubbed with a finger. The composition of Experiment 3 was not capable of forming a dielectric film, and thus neither of the Experiments following the teachings of Takashina were able to achieve a dielectric film.

Applicants respectfully submit that the evidence in the Rule 132 Declaration establishes that the polishing composition of Takashina is not a dielectric film forming liquid composition as required in the present claims.

Applicants submit that in view of the evidence in the Rule 132 Declaration, the requirement that the composition of claim 1 be a dielectric film forming liquid composition is a material limitation to the claims that distinguishes the present claims from the teachings of Takashina. Even though the limitation is recited in the preamble of claim 1, as explained in MPEP 2111.02.II, where the Applicant relies upon the preamble language to distinguish over the teachings of a reference, the preamble has a limiting effect. Accordingly, Applicants respectfully submit that the Patent Office must consider the preamble language, and submit that the present claims distinguish over the teachings of Takashina because the present claims require a dielectric film forming liquid composition whereas Takashina has been shown to not be capable of forming a dielectric film.

In addition to the foregoing, the present claims should be found patentable over the cited art for additional reasons. For example, the Patent Office acknowledges that Takashina also differs from the dielectric film forming liquid composition of claim 1 in failing to describe or suggest the use of diamond fine particles purified and oxidized by heating with a purifying agent. The Patent Office alleges that this requirement would have been obvious to

one of ordinary skill in the art based upon the teachings of Hiraki "motivated by the fact that this results in obtaining diamond particles which are not only functionalized and oxidized but also have lost at least less than one tenth of their impurities" and that "in view of this, it is taken that the use of pure diamond would preclude the inclusion of impurities in the polishing composition of [Takashina], thus, minimizing the contamination of the substrate it is used upon." Applicants respectfully submit that one of ordinary skill in the art would not have found it is obvious to have used diamond fine particles purified and oxidized by heating with a purifying agent based upon the theory of the Patent Office.

Hiraki describes a process of boiling diamond particles in a sulfuric acid solution in order to remove contaminants that coexist with the diamond. See the Abstract. The Patent Office alleges that it would have been obvious to have purified and oxidized the diamond particles of Takashina based upon Hiraki's teaching that this can reduce metal impurities in diamond particles. The Patent Office further theorizes that one would have been motivated to have done this in order to minimize contamination of the Takashina substrate polished using the diamond particles. However, neither Takashina nor Hiraki describe that the diamond particles provide any kind of contamination to a substrate being polished, and thus neither reference provides a reason to seek the use of pure diamond particles in the Takashina polishing composition.

Moreover, Takashina describes not only the use of diamond as a possible abrasive particle in the polishing composition, but also describes the use of numerous metal-containing abrasive particles as possible polishing agents. In view of this, there is clearly no concern in the art regarding potential metal contamination of a semiconductor substrate to be polished using the Takashina polishing composition, and thus no reason for one of ordinary skill in the art to have sought to have used purified and oxidized diamond particles in the Takashina composition.

Hiraki seeks the use of purified diamond particles to enable formation of a uniform diamond particle layer on a substrate. Hiraki does not seek a liquid polishing composition as in Takashina. Nothing in either Takashina or Hiraki would have led one of ordinary skill in the art to have sought to have used purified and oxidized diamond particles in Takashina's polishing (non-film forming) composition for any reason. The rejection should be withdrawn for these additional reasons.

The Patent Office further turned to the teachings of Swidler and Pyridine Safety Data as allegedly suggesting the use of pyridine as the pH adjusting agent in Takashina's polishing composition. Applicants respectfully submit that neither Swidler nor Pyridine Safety Data remedy any of the deficiencies of Takashina and Hiraki discussed above.

During the October 4, 2010 interview with Examiner Parvini, it was suggested that the Rule 132 Declaration needed to include experiments similar to Experiments 2 and 3 in the Declaration but using pyridine as the amine. Applicants respectfully submit that such additional experiments are not necessary. In particular, Experiments 2 and 3 in the Rule 132 Declaration already use monoethanol amine, an amine that, like pyridine, is suitable for use as the amine substance in the presently claimed dielectric film forming liquid composition. Applicants thus respectfully submit that the evidence in the Rule 132 Declaration already sufficiently compares the Takashina composition to the presently claimed dielectric film forming liquid composition.

Moreover, there is no indication that altering the particular amine substance in the composition would alter the results. The Takashina composition is a polishing composition that has been shown to be incapable of forming a dielectric film, and such is a result of Takashina describing a polishing composition, and not the result of the particular amine selected. Providing additional evidence particularly comparing against a pyridine containing polishing composition should thus be unnecessary.

During the October 4, 2010, the Examiner also suggested that claim 1 be amended to reference that the film formed by the dielectric film forming composition is a uniform film as shown in Experiment 1 of the Rule 132 Declaration. Applicants respectfully submit that this not necessary for several reasons. First, in order to perform as a dielectric film, the film must have certain properties, including a certain level of uniformity. Accordingly, having sufficient uniformity to form a dielectric film is already included within the language of claim 1 requiring the ability to form a dielectric film. Second, it is not necessary to recite in the claims any unexpected results shown in a Rule 132 Declaration. Inclusion of the properties shown in the Rule 132 Declaration is thus also not required for this additional reason.

For all the foregoing reasons, reconsideration and withdrawal of the rejection are respectfully requested.

III. Rejoinder

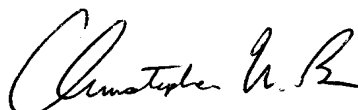
Upon allowance of claims 1, 3, and 14-19, Applicants respectfully submit that claims 7 and 8 should be rejoined with the application and similarly allowed.

IV. Conclusion

In view of the foregoing, it is respectfully submitted that this application is in condition for allowance. Favorable reconsideration and prompt allowance of claims 1, 3, 7, 8 and 14-19 are earnestly solicited.

Should the Examiner believe that anything further would be desirable in order to place this application in even better condition for allowance, the Examiner is invited to contact the undersigned at the telephone number set forth below.

Respectfully submitted,



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